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Home College Series.

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THE WATCH AND THE CLOCK.

BY

REV. ALFRED TAYLOR.

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J. H. VINCENT.

NEW YORK, *Jan.*, 1883.

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THE WATCH AND THE CLOCK.

One of the proudest days in a young man's life is that on which he first becomes the possessor of a watch. Whether the watch is presented to him, or is the purchased result of his own savings, it is in his eyes the best time-piece in the world. At once he begins to test by it the accuracy of every watch and clock he meets, and to time every occurrence as it takes place. A bright lad, on his birthday morning, received a watch as a present from his father. After the presentation the next event was family prayers. When the family rose from their knees the bright lad pleasantly remarked, as he held his watch in his hand, "Pa, that prayer was just three minutes and a half." To be unable to use a watch or clock is evidence of great lack of education. A newly-arrived servant, having been sent to the kitchen to look at the clock and report the time of day, returned after about a quarter of an hour saying, "Well, ma'am, as near as I can make it out, one of the hands is a p'intin' straight upward, and the ither one is half way aroond the face uv the clock." Biddy's acquaintance with time-keeping machinery had been but slender.

Now that watches have become so common that almost every body carries one, and clocks are so cheap that the poorest family can have one in the house, it seems strange to think of the days when even the most wealthy and distinguished had neither clock nor watch. As far as we can learn, the sun-dial was the sole reliance of the ancients for finding out the time of day. As to the time of night, they had to guess at it, and so with the days which were cloudy and stormy. Notwithstanding this, there were skilled astronómers both in Assyria and in Egypt, and probably in

other countries. The most ancient sun-dials are variously called "dials," "steps," and "degrees." The earliest biblical mention of a "dial" is that of Ahaz, King of Judah, about 740 B.C. Such sun-dials as are now in use, the principal feature of which is an index or gnomon casting its shadow on a dial, are supposed to have been invented by Anaximander of Miletus, in Greece, about 500 B. C. He was a philosopher, mechanic, and astronomer.

About 600 B. C. the clepsydra, or water-clock, came into use. Scipio Nasica, a Grecian, is said to have been the inventor. This clock registered the flight of time by dropping water from one vessel to another. It was introduced in Rome, and found its way to India. The Egyptians made the clepsydra in many grotesque and artistic forms. Such a time-keeper was necessarily inaccurate. The best that can be said of it is that it was an improvement on having no time-keeper at all. Yet in those days, and for many centuries after, there were no railway trains to be started on time, no steam-boats to make close connections, nor any business requiring the rigid punctuality and accurate observance of minutes, and the fractions of a minute, which the time-keepers of the present day record.

The hour-glass, which by the flow of sand marked the passage of the hours, was the next improvement on the water-clock. About 300 A. D. this time-keeper came into favor. It consists of a wasp-shaped vessel, very narrow at the waist. The sand falls from the top part through a small hole in the waist to the bottom part. When it has all fallen, it denotes that an hour or some other measure of time has passed. By the old New England preachers hour-glasses were sometimes used to tell the length of the sermons. The glass was placed on the corner of the pulpit, and it was not unusual for the good old dominie to turn it twice in the course of his sermon. Yet the congregation patiently stood these long discourses. Nowadays, if a preacher continues

for over half an hour, there is no hour-glass to encourage him in keeping on longer; but, on the contrary, he is reminded by the clicking of watches that some of his hearers are marking the time, and that they wish he would stop.

To note all the events in the growth of the perfection of time-keeping apparatus would require a large volume. King Alfred, of England, made a radical improvement. It consisted of wax candles which burned at the rate of an inch an hour. Six of his candles lasted twenty-four hours. They were in charge of a chaplain who had nothing else to do but to attend to them. When a cover or chimney of horn was invented to shield these candles from draughts of air, and thus to keep them from flaring and burning irregularly, it was considered a great triumph of inventive genius.

A clock which should go by weights and wheels had for centuries been aimed at by the ingenious. There is no certainty as to who made the first success in this endeavor. Certain it is that there were many attempts which came very near to being successful. Some say that Archimedes, B. C. 250, made a partial success. About 800 A. D. the King of Persia sent to the Emperor Charlemagne a striking clock, curiously constructed of brass. When it struck, horsemen of brass marched out of a window, and then marched in again. Ingenious as was this work of the Persian mechanics, it was worked by water, after the manner of the old clepsydras. Pacificus, Archdeacon of Verona, made something like a clock in the ninth century, and so did William, Abbot of Hirshaw, in the eleventh. Robert Wallingford, Abbot of St. Alban's, in England, made a clock about 1300. Gerbert, who afterward became Pope Sylvester II., made a clock at Magdeburg in 996. There is some uncertainty as to whether this ran by weights or by water. The Canterbury Cathedral clock was built in 1292, and that of Exeter Cathedral in 1317. The first Strasburg Cathedral clock was finished in 1334. The first great clock of Westminster

was made in 1288. The pendulum was not invented until four centuries after this. The early clocks had a vibrating balance, instead of a pendulum, and must have run very irregularly. In fact, it was a part of the business of the monks, in cathedrals where there were clocks, to regulate the hand from time to time, and make it point to what the sun showed to be about the right time of day. Clocks then had only an hour hand, the minute hand being an addition of later inventors. As late as the time of Henry VIII., of England, clocks were called *horologes*. When striking clocks became more common, their present name was applied to them. It is from the French *cloche*, a bell. There arose a public demand for a time-keeper which should be less clumsy and costly than the clock. The clock was available only when standing in an upright position. People wanted something which could be carried in the pocket. After many struggles of inventors, and many discouraging failures, the

"POCKET CLOCK"

was at last produced. The first important step in this direction was the invention of a coiled spring for the motive power, to take the place of the weight which had kept the clock-work in motion. Instead of the pendulum, the use of which compelled the clock to be kept upright, the balance-wheel with a spiral spring was invented as a regulator. Open your watch, and you will see this balance-wheel diligently at work, with the "hair-spring" inside of it. It makes over 18,000 motions in the course of a day. Think how accurately those motions must be figured out and regulated to make your watch keep any thing like accurate time. The name of the inventor of the main-spring is involved in uncertainty, and so is that of the man who first made a balance-wheel and hair-spring. These inventions bear date of the fifteenth century. Until the invention of the balance-wheel the main-spring was of little use, for it carried the

train of wheels with irregular motion, and much too rapidly. Among the many places which claim the honor of the invention of "pocket clocks," as watches were at first called, the ancient German city of Nuremberg appears to hold the most valid claims. The early watches were called "Nuremberg eggs," from the fact that they were made in oval shape. The claim reaches back as far as 1477, although there is nothing that can be positively established in regard to it until 1490. About that time an ingenious mechanic, named Peter Hele, produced what, for that age, was a remarkable triumph of horological skill. This curiosity was about six inches wide and nine long, being in oval shape, and of a style of finish which would be regarded as by far too heavy for the ordinary pocket of modern days.

The Emperor Charles V., of Germany, had a mania for collecting clocks and watches. After his retirement to the monastery of St. Juste, he spent much of his time in gratifying his fancy of trying to make several watches keep accurate time together. The perfection of modern mechanism has made this possible which was, with the imperfect work of those days, an impossibility. Weary with his fruitless endeavors, he one day remarked in disgust, "What an egregious fool I have been to have squandered so much blood and treasure in an absurd attempt to make all men think alike, when I cannot even make a few watches keep time together!" One day, while several watches were on the table before him, a careless monk came blundering into the room, and stupidly upset the table with all that was on it. The emperor remarked to the monk, "I have been laboring for some time to make these watches go together, and now you have accomplished it in an instant."

One of the most famous of the early watches was that made by Jacob Zech, of Prague, in 1525. It is still in existence. The body is inclosed in a circular case or box, of gilt brass, measuring nine and three-quarter inches in diameter by

five inches in height. Both the design and workmanship of this case are in excellent taste, and the bold, foliated decoration around its sides is finely finished. The arabesque portion is divided into three shields; of these the first, bearing an eagle displayed and crowned, surmounted by a royal crown, shows Poland; the second, bearing a serpent entwined and wavy pale, crowned, a child issuant from its mouth, and surmounted by a ducal crown, typifies the house of Visconti; and the third shield displays the arms of Lithuania, a knight armed *cap-a-pie*, and mounted on a horse, holding in his dexter hand a drawn sword, and having pendent from his neck a shield charged with the Hungarian cross. Such are the bearings on the periphery of the clock case; and in the center of the dial-plate is an escutcheon, with the arms of Poland on the dexter side, impaled with those of Visconti on the sinister. The whole are clearly and boldly represented. This clock was the property of Sigismund I., King of Poland, surnamed the Great.

The watch-makers of the sixteenth century made rapid advancement in their art. In 1544 the Guild of Master Clock-makers in Paris obtained a statute from Francis I., which secured to them the sole privilege of making clocks and watches of all sizes and descriptions within the limits of that city. About the same time watches were introduced into England—not by any means a common article of use, but only for the great and wealthy. King Henry VIII. had a fancy for curious watches. At his palace at Westminster he had, in 1542, a "larum or watch of iron, the case being likewise gilt, with two plumettes of lead." This seems rather to have been a portable alarm clock than a pocket timepiece. He had a watch which would run for a week, and another which is described as having a "case of gold." As this cost only £10 10s., possibly the "case of gold" was not very heavy or solid; still, we must remember that the purchasing power of money was much greater in those days than now.

Mary Queen of Scots had a number of odd and curious watches, chief among which was her famous skull-shaped one. This was bequeathed by her to her maid of honor, Mary Setoun, and is still in existence. It is silver gilt. On the forehead of the skull is the figure of Death, with scythe and sand-glass. On the back of the skull is a representation of Time devouring all things. There are, besides, various curious and grotesque devices. The watch is opened by reversing the skull and then lifting the under jaw, which rises on a hinge. The dial-plate is where the roof of the mouth would be in a human being. A silver bell, on which a hammer strikes the hours, fills the entire hollow of the skull.

John Knox, the great reformer, received as a present from Mary Queen of Scots a curious watch in a crystal case, of oblong, octagon shape. It is still preserved. A thread of catgut is found in place of the chain used in more modern watches. This catgut is not found in later watches than those of the sixteenth century. This is a very small watch, being only an inch and a half long and an inch and two tenths wide. It has two lids of silver. The dial-plate is nine tenths of an inch in diameter, and inscribed with Roman numerals.

In the days of Queen Elizabeth watches were more generally introduced, and were often worn by the wealthy as ornaments, rather than as conveniences for telling the time, for, with all the ingenuity of the watch-makers of those days, it was frequently the case that an elaborately finished watch was of little value as a time-keeper. All manner of curious designs were brought into service in the embellishment of watches. Some retained the original egg-shape, while others were fashioned like crosses, acorns, pears, skulls, flowers, and other whimsical forms. The works of these watches were, for the most part, of iron and steel.

Queen Elizabeth's fancy ran to various oddities in watch

decoration. One of her many watches is described as a "little clocke of goulde, with a cristall, garnished with sparkes of small diamonds, sparkes of rubyes, and sparkes of emeraldes, and furnished on the back syde with other dymonds, rubyes, and other stones of small value."

Watch-making became one of the great industries of Switzerland. The manufacture of watches in that country dates from the small beginnings of Charles Autun, who, in 1587, went from Burgundy to Geneva to escape religious persecution. But very different from the Swiss watches of the present day were those which this man and his successors turned out. They were clumsy and inaccurate, yet they generally sold for about their weight in gold. In the seventeenth century the Swiss abandoned the old-fashioned fusee chain, and substituted the coiled hair-spring balance. In 1658 a watch containing this improvement was presented to King Charles II., of England. The next improvements were in the escapements. The escapement is that part of the mechanism, either in a watch or a clock, which connects the regulating power with the wheel-work. But for the escapement the clock or watch would run down as soon as wound up. Almost every manufacturer has some different form of escapement.

About the year 1700 jewels were introduced as bearings for the pivots. Previously the pivots had run on metal, and in the course of years there was more or less damage from wear. One Nicolas Faccio, of Geneva, about 1664, discovered a way of piercing rubies and other gems so as to serve for bearings. Minute pieces of sapphire, garnet, chrysolite, or agate, were also found to answer well. These were pierced by a diamond-pointed drill. For some of the cheaper watches bits of glass were introduced as bearings, but never with perfect satisfaction. The setting of the jewels in a watch is now regarded as one of the most important parts of superior watch-making. If these are set

strong and true the watch runs well. If they are poorly placed, or if they are of irregular shape or of inferior quality, the watch is a failure for purposes of accurate time-keeping.

The balance-wheel was far from perfect in its original introduction. Even so small a piece of metal is subject to expansion and contraction by reason of heat and cold. The watches which were made before its perfection, both in Switzerland and England, were such as hardly any body would now be willing to carry. They were made almost entirely by hand. No two corresponding parts of watches were exactly alike. The compensation balance of John Harrison was the next great improvement, bearing date about 1767, its invention being also claimed by Berthond, a London watch-maker. Its circumference is divided into two sections, the ends of which are fastened to a cross-bar of steel. The outer rim of the balance being of brass, and the inner of steel, the compensation between the two metals in their contraction and expansion is accurate. With this the English watch began to attain its high development as a time-keeper. The making of watches was introduced in England as a business in 1679 by a Swiss mechanic, who went from Geneva to London. The greater facility enjoyed by the Swiss for producing accurate work had the effect of introducing Swiss watches extensively into England. The Swiss watch was much lighter and more convenient than the English. There was a great fancy among Englishmen for the heavy and solid style of watch known as "bull's-eyes." The common English watch was generally of this kind, and was far from reliable. Dickens graphically pictures it, in speaking of Captain Cuttle's memorable time-piece :

"The captain immediately drew Walter into a corner, and with a great effort that made his face very red, pulled up the silver watch, which was so big, and so tight in his pocket, that it came out like a bung."

"Wal'r," said the captain, handing it over, and shaking him heartily by the hand, "a parting gift, my lad. Put it back half an hour every morning, and about another quarter toward the afternoon, and it's a watch that'll do you credit."

Such time-keeping as that might serve Captain Cuttle's purposes, but it would not answer now. With railroad trains and steam-boats which depart on time, with appointments which must be kept to the moment, with many important interests depending on exact punctuality, our watches must be as accurate as the motion of the sun. A man having bought a new watch, stood on the sea-shore with the treasure in his hand just before sunrise, and said to his friend who stood beside him: "There, now, it is one minute to sunrise. If the sun don't begin to lift himself out of that ocean in sixty seconds, why, he'll be late, that's all." Thirty years ago, when rigidly exact punctuality was in hardly as great demand as now, a young man who was just beginning business was introduced by his father to a wealthy and somewhat eccentric capitalist, with whom he hoped to have some business transactions. The result of the first interview was that the capitalist said to the young man, "Come to my office to-morrow at one minute past twelve." The young man was amused at such an appointment, and mentioned his amusement to his father. The father said, "Well, my boy, do you see that your watch is right, and enter his office precisely at one minute past twelve." The youth did so, and at once found himself in favor with the capitalist, with whom he afterward had many transactions.

The systematic division of labor in Switzerland has done much toward securing accuracy among the watch-makers of that country. Workmen there are patient and plodding, and have not the ambition for change and progress that American mechanics generally have. Pieces of metal are cut out at the watch factories, and given to workmen at their homes

to fashion and finish. They are then returned to the factories to take their places in the completed watch. It is often the case that an elderly man is found working on the same delicate part of watch construction that he has been working on from boyhood. Not only is this the case, but sometimes it happens that the man's father and grandfather worked on exactly the same.

The Time-keepers of our own Country.

America's mission was not at first in the fine arts or in delicate and dainty mechanism. For three quarters of a century after our forefathers declared independence, the inventive and ingenious brain and muscle of the land employed itself chiefly on farming implements, munitions of war, and means of locomotion. Our finer articles of apparel were brought from Europe, and so were jewelry and similar luxuries, including watches, which had not then become the necessity they are now. Clocks had been made, especially in Connecticut. Some of these had wheels of hard wood, and kept quite respectable time. Some of them were fit only to be sold by peddlers to persons whom they never expected to see after making the sale. Some quite excellent tower and turret clocks had been made, but they were few and costly. In 1852 Mr. Howard, of Boston, and his friend, Mr. Dennison, laid the foundation of American watch-making. They were both practical clock and watch makers, and had they not been men of the most persistent determination they would never have overcome the difficulties which they found in their way. The story of their success would be very voluminous. Suffice it to say that America has beaten the world on watches. At moderate prices the factories of this country have made the possession of a watch possible to the humblest mechanic who chooses to save enough from his beer or tobacco to make the investment. There are six or eight great factories in this country constantly producing

immense quantities of watches which can be relied on to tell the time. Such a watch as in former times would cost, if imported from Switzerland, about $100, can now be bought for $50. The first watch factory in America is still located at Roxbury, Mass., in the original building where it was established, many additions having, of course, been made to it. About 200,000 watches have been made in it. Not many miles away is the famous "Waltham," which has recently finished its two millionth watch. Illinois has two principal factories —the "Illinois," at Springfield," and the "Elgin," in Elgin. A factory has recently been established at Lancaster, Pa. One of the most wonderful of American watch-making industries is that at Waterbury, Conn., where thousands of watches are turned out at a cost of only a little over three dollars each. These watches have neither gold case nor ruby jewels, yet they keep time. The highest cost of American watches is seldom over $200, except where watches of curious mechanism or of very ornate exterior are made to order. In this case fancy prices are put on according to circumstances. The Swiss factories and some of the French make watches of complicated construction, with half and quarter second dials, with weekly and monthly calendars, and sundry other ingenious additions. The cost of such "complicated" watches in plain cases sometimes runs as high as six or seven hundred dollars.

The first watch made in this country is a historical curiosity. It is in possession of Mr. Howard, of Boston, and is as good as new. It has two main-springs, by reason of which it is heavy, although it does not appear clumsy. This was a fancy of the first makers, who thought that an eight-day watch would be desirable. It winds by a key instead of by the stem-winder, which in later years has taken the place of key-winders. It is to be hoped that this watch may be kept for generations, as it is an important part of the country's history of progress in art and manufacture.

As to clocks, American ingenuity and capital have made us independent of foreign makers. A clock can be bought anywhere from a dollar to three thousand dollars. For the latter price there are such as the one in the *Tribune* building, in New York, or the Grand Central Depot. The dollar clock may stand on your mantel, and will sometimes tell the time, while at other times it resolutely refuses to tick. A good clock, well cared for, will, like a good watch, last a great many years. Some clocks, both for home use and for offices, are furnished with calendar-dials, which tell the day of the week and of the month. Some have astronomical attachments representing the motions of the heavenly bodies. As yet the cost of these has kept them from becoming very common. Yet there are reasons to believe that they may generally be introduced, for a watch has now been made in Vienna, with weekly and monthly calendar dials on its face, which sells for about twelve dollars.

The Watch in your Pocket.

A watch is a valuable possession, provided it tells the time faithfully. If it is a poorly made watch, which will not tell the truth, it is not worth having; in fact, it is worse than useless, for it is a wretched deceiver. The man, woman, boy, or girl, who will not take the trouble to wind a watch regularly, is an undeserving and unreliable person who cannot be depended upon, and who is not worthy of the cheapest watch in existence.

A good watch is worthy of the best care. It is a delicate piece of mechanism. Although made with a view to long and accurate service, it may by a little carelessness be incapacitated for duty. The amount of care required to keep a watch in good running order is exceedingly little.

The treatment of a watch must be uniform and regular. The watch should always be carried in one position as nearly as possible, namely, upright, in a flat watch-pocket. It

should have a pocket exclusively to itself, into which dust, dirt, pins, and crumbs are not likely to intrude. When taken off at night it should be hung up rather than laid flat.

The winding of a watch is a matter requiring careful attention. Some special hour should be selected for it. Many people wind their watches on retiring at night, and many prefer to do it when they rise in the morning. It makes little difference, provided a regular time is observed.

Never take a watch near a magnet. If the springs become magnetized, mischief follows, which is very difficult to rectify.

When a watch is in the least degree out of order, take it to a good watch-maker for repair. There is no advantage in trusting a good watch to an inferior workman for the sake of a supposed economy. Every watch which is at all valued by its owner should be cleaned once a year, or at farthest once in two years. Even with the greatest care and the most thorough protection to the works, infinitesimal particles of dust will enter the watch and become lodged in the wheels. Furthermore, the old oil needs to be wiped out and minute drops of new oil to be substituted.

Let every owner of a watch or clock remember that "time once past never returns," and endeavor to live "redeeming the time, because the days are evil."

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